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The Effect of Inflation on Savings Behavior

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The period of the early 1970's was unprecedented in 20th century economic history in the amplitude and variability of the behavior of consumer prices. The U.S. economy experienced a rapid rate of inflation which sent shock waves through real disposable personal income and consequent ripples through savings and expenditure decisions. From the fourth quarter of 1973 to the first quarter of 1975, constant (1958) dollar disposable personal income fell from $622.9 billion to $591.0 billion. In per capita terms, real personal disposable income declined by 6 percent over this period.

The intent of this paper is to analyze the effect of the recent inflation on personal savings behavior. We begin by presenting a simple graphical analysis of a consumer's response to inflation where it is assumed that consumers have a preferred real wealth - real income relationship which they attempt to restore whenever actual behavior departs from desired wealth-income behavior. We also view evidence of the effect of inflation on the real value of financial asset holdings of the public. The distinction is made between anticipated and unanticipated inflation and the effects of each on personal savings behavior. A crude measure of these two types of inflation indicates that a large portion of inflation in recent years has been unanticipated by the public.

A framework for analysis

To begin our analysis let us consider an economy where there are two types of financial assets, money and government bonds. If we assume, for convenience, that all bonds are perpetuities paying $1 coupons, then the price of a bond will simply equal the inverse of the current market interest rate. The nominal value of aggregate wealth will be given by

$$W = M + B/r \qquad (1)$$

where W is aggregate nominal wealth, M the nominal value of money, B the total number of bonds (each paying a one dollar coupon) and B/r the nominal market value of bonds held by the private sector. Deflating aggregate wealth by a measure of the "general price level" we obtain a measure of "real financial wealth," or

$$\frac{W}{P} = \frac{M}{P} + \frac{B}{rP} \qquad (2)$$

The accumulation of wealth by an individual or a society is not a random process. Individuals have different savings behavior over their lifetimes and over business cycles. The rate of savings is greatly dependent on the level of wealth and the relationship of wealth to income. Since the value of wealth changes with changes in aggregate prices, it would be expected that savings behavior would respond to changes in real wealth induced by changes in prices.

If we broaden our definition of financial assets to include financial claims on real capital, such as equity securities, we obtain a definition of nominal wealth as follows:

$$W = M + \frac{B}{r} + \frac{E}{\rho} \qquad (3)$$

where we have added E, the expected earning stream from capital discounted by a market determined "discount rate." The discounted earning stream is the value of privately held shares of stock. The deflated version of (3) would yield a measure of real financial wealth.

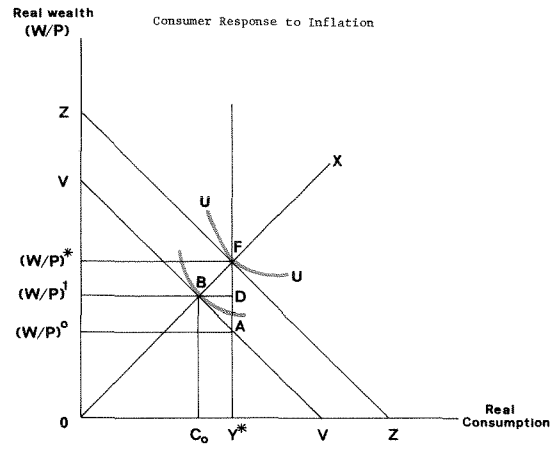
The desired money-income concept can be

broadened to include other forms of financial wealth, resulting in a desired wealth-income relationship. The economic foundations underlying desired wealth-income behavior are quite complex and will not be investigated here.[1] What will be undertaken is to define in very simple terms a consumer's "equilibrium" wealth-income ratio and a description of the mechanics by which the consumer restores his desired ratio after he is displaced from it by some exogenous force, such as inflation.

How do we envision the wealth accumulation process taking place? A simple illustrative answer can be given by considering an individual's behavior, where it is assumed that the individual receives a flow of constant real income each period. He begins the period with a given stock of real wealth (W/P). Let us picture the individual initially in "equilibrium"; that is, his ratio of real wealth to real income is at its desired value.

In Chart I is shown an individual's preference curves for real consumption and real wealth, along which the individual is equally well off. (These preference curves are shown in blue.) His income each pay period is OY* and initially we assume that his real wealth is (W/P)* and he consumes all of his real income, OY*. The consumer's objective is to reach the highest preference curve possible, given his real income and real wealth. The individual may move along the line ZZ, consuming more than his real income, OY*, only by drawing down his real wealth. Notice that the sum of an individual's weekly income and his initial wealth gives us the total amount of possible consumption, OZ. His preference function for consumption and wealth, UU, places him in "equilibrium" at F. He is said to be in "equilibrium" at F because at this point he is maximizing his utility; any other point on the line ZZ would place him on a lower preference curve. At any other point on line ZZ there would be the incentive to move towards F created by the consumer's attempt to attain the highest utility. The line OX is made up of the series of tangencies of all his preference functions with "unit budget-wealth lines,"

Chart I



parallel to ZZ. That is, lines parallel to ZZ permit $1 of real financial wealth to trade for $1 of real goods.

Having defined the consumer's equilibrium we need to explore now the dynamics of his behavior. How will the consumer react if he is moved away from point F? These simple dynamics create the incentive for the consumer to change his savings behavior in an attempt to return to equilibrium at point F. At F the individual consumes all of his income. Now let us shock the system and describe his behavior.

Let the "shock" be an unanticipated increase in the general price level. The immediate impact is to decrease the value of the individual's total financial wealth, for example, reducing it from (W/P) to $(W/P)^{\circ}$. The consumer moves from equilibrium point F to point A. The consumer's new budget line is now VV, equal to his reduced wealth $(W/P)^{\circ}$ plus his income, OY*. The maximization of utility will lead the consumer to choose a consumption point on OX, moving from A to B, where he will consume OC_0 and save BD, thereby increasing his wealth by the amount of his savings. In the next period he will again receive OY* in real income (which is assumed constant) and now his opportunities are such that he may consume anywhere on a new line parallel to VV and going through the point D. The act of saving will continue to shift the budget-wealth line outward and allow the indi-

vidual to increase his satisfaction, until he arrives at his equilibrium point at F. At F he will remain there, now consuming all of his income, unless a price rise or fall should displace him. This example illustrates that the consumer will temporarily increase his savings rate in order to reestablish his desired real wealth-income relationship at point F.

While the above illustration is admittedly lacking somewhat in reality, because of the assumption of constant real income, it does illustrate a simple conceptual framework within which to picture individual wealth adjustments to price changes. Very simply, individuals respond to short-term changes in the real value of their financial assets by increasing or decreasing their level of real consumption. This gives rise to the notion of "wealth effects in consumption," where here we have considered the effect on consumption of changes in real financial wealth.

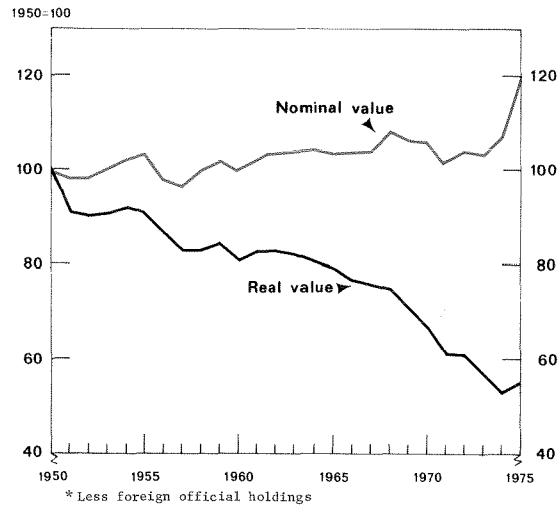
Some recent evidence of the wealth effect

A common economic adage tossed out when discussing the effect of inflation on the value of financial assets is that debtors gain and creditors lose. Considering the nominal and real (deflated) value of the federal government's outstanding debt to the private sector, this adage appears to have held painfully true in recent years. If we consider the par value of all privately held public debt, that is, public debt held outside of the Federal Reserve and government agencies, less the portion of public debt held by foreign official institutions, we see that federal government indebtedness to the private sector has increased by 20 percent from 1950 to mid-1975 in nominal (par value) terms but declined by 45 percent in real terms. (See Chart II.) To obtain the real value of privately held public debt we have deflated the nominal par value series by the consumer price index. In real terms this measure of privately held government debt fell from $271 billion in 1950 to $147 billion in 1975.

Although a series on the market value of privately held public debt is not available, we can readily argue that our observation on the decline in real value is understated by way of the fact that interest rates have risen significantly since the 1960's, reducing the market value of privately held public debt. In the early to mid-1960's the long-term U.S. Government bond rate moved between 4 and 5 percent, but moved up to 7 percent in the first half of the 1970's.

Chart II

Real and Nominal (Par) Value of Privately Held Public Debt*



*Less foreign official holdings

The losses suffered by the private sector in the government securities market found little solace in the activities in the equities market. Between 1965 and 1974 the Standard and Poor's Combined Index of 500 stocks fell by 6 percent, but when deflated by the consumer price index fell by 41 percent.

Rises and falls in the general price level should be viewed as the consequence of the attempts of the private sector to adjust their holdings of *real* money balances. If real money balances are greater than desired the private sector can only restore real money balance equilibrium by pushing up prices, reflected in their excess demand for real goods. While short-run changes in the prive level may be influenced by exogenous forces, such as a rise in imported oil prices, the long-run trend in prices is closely related to the long-run trend in money growth.

If we consider the aggregate wealth portfolio

of the private sector in this light we notice that the monetary authorities greatly influence the quantity of nominal money balances held. Through their influence on the holdings of nominal money balances they cause the private sector to respond to deviations between desired and actual *real* money balances by bidding up or down prices. These actions in turn cause changes in the value of real private financial wealth and the savings behavior of the private sector.

Personal savings and inflation

A cursory look at the data would suggest that there is a positive although not always contemporaneous relationship between the personal savings rate and the rate of inflation. As inflation accelerated in the 1970's over the 1960's, the personal savings rate out of disposable personal income rose from about 6 percent to around 7¾ percent. Personal savings as measured as a percent of gross national product similarly increased from 4.1 percent in the Sixties to 5.4 percent in the Seventies. During these two periods the average annual rate of growth in the CPI went from 2.5 percent to 6.7 percent.

The acknowledgment that the personal savings rate is sensitive to inflation is reflected in the recent statement by Federal Reserve Governor Henry Wallich.

> Personal savings in recent years have amounted to about one-third of total savings. They have varied with the business cycle but have otherwise been fairly stable at about 5% of GNP. At the present time, personal savings have tended to rise above these long-term savings rates, probably reflecting concern of savers about the stability of their jobs, inflation-induced uncertainty about future living standards, and an effort to make up for the loss in the purchasing power of past savings. As inflation abates and the economy recovers, personal savings, if precedent is a guide, are likely to move back to their long-term rate.[2]

In order to more clearly understand the relationship between inflation and savings behavior we must make the distinction between anticipated and unanticipated inflation. Perfectly anticipated price inflation to which people have had time to adjust should be reflected in the current allocation of disposable income and have no effect on future allocations. For example, a perfectly anticipated price inflation is a tax on real money balances which would cause us to reduce real money demand and increase goods demand. However, this perfectly anticipated inflation would have no effect on future allocations because the anticipated inflation is already reflected in current spending decisions and market interest rates.

Unanticipated inflation, or "surprise inflation" may, on the other hand, have a significant short-run effect on spending decisions. Unanticipated inflation represents an unanticipated decline in the real purchasing power of personal disposable income and in real wealth. This increased uncertainty in the value of personal income and wealth causes consumers to retrench on their spending decisions and increase their precautionary savings balances. This argument would lead one to conclude that the larger the unanticipated inflation, the greater the personal savings rate, while the larger the anticipated inflation the lower the saving rate.

In order to obtain rough estimates of anticipated and unanticipated inflation we have relied on Irving Fisher's theory of the relationship between nominal (market) interest rates and anticipated inflation. Simply stated this relationship is

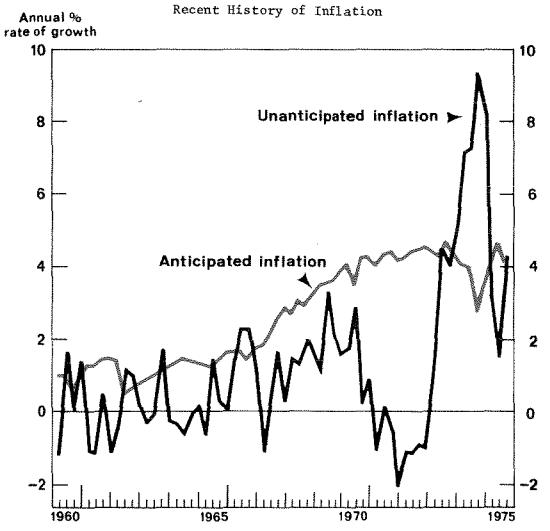
$$r_t = rr_t + \left(\frac{\dot{p}}{p}\right)^e_t \qquad (4)$$

where r_t is the observed market rate of interest, rr_t the "real rate of interest," and i.e. $(\dot{p}/p)^e_t$ the expected or perfectly anticipated rate of inflation. The observed rate of interest will equal the real rate only when prices are not expected to change.

In order to obtain an estimate of anticipated inflation equation (4) was used. The nominal market interest rate estimate was provided by using Standard and Poor's high grade bond yield. Standard and Poor's composite dividend yield was used as an estimate of the real interest rate. Subtracting the dividend yield from the high grade bond yield provides us with a crude approximation of anticipated inflation.[3]. This estimate of anticipated inflation was then subtracted from the actual rate of inflation, our

Chart III

Recent History of Inflation



measure being the CPI, thereby obtaining an estimate of the unanticipated rate of inflation.

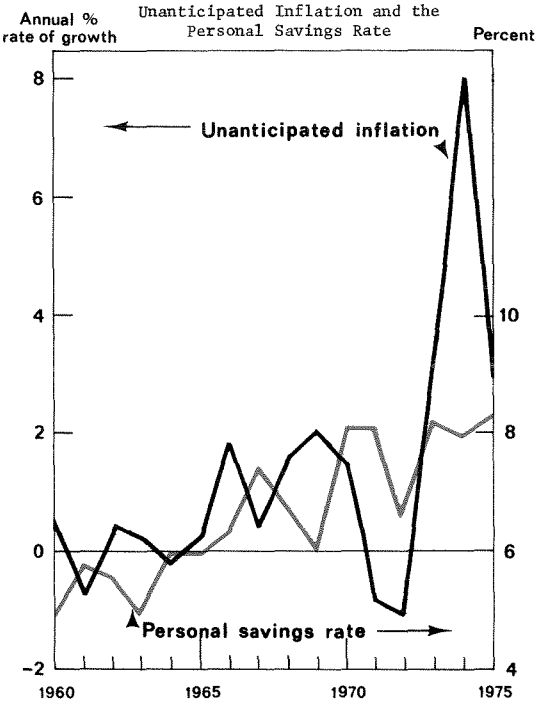
Chart III plots our measures of anticipated and unanticipated inflation. During the first half of the 1960's anticipated inflation went from about one to two percent. In mid-1967 anticipated inflation grew rapidly and reached four percent by 1970, after which it appeared to stabilize between 4 and 5 percent.

A look at the unanticipated inflation component displays how the public gradually learned to adjust to price rises. From 1960 to 1967 unanticipated inflation averaged less than one-half percent and then rose to an average 2.2 percent from 1968 to the third quarter of 1975, indicating that a large element of the recent inflationary experience was unanticipated. During the early 1970's people began to anticipate price changes with some degree of accuracy and unanticipated inflation fell, actually becoming negative in 1971 and 1972 during the period of wage and price control. After that, however, actual and unanticipated inflation sky-rocketed, the latter exceeding 9 percent in 1974. This rise in unanticipated inflation is a major reason for the average personal savings rate in excess of 8 percent from 1973 to 1975.

There is also some solid statistical evidence to support the positive savings effect of unanticipated inflation and the negative savings effect of fully anticipated inflation. Juster and Wachtel have found that for the period mid-1954 to mid-1971 a one percent rise in unanticipated inflation would increase real ($1958) savings per household by $21.50.[4] A one percent increase in fully anticipated inflation, on the contrary, decreased real savings by $15.10 per household. Chart IV displays the movements in the savings rate and unanticipated inflation since 1960. While these two series do not always move together contemporaneously, the average personal savings rate has moved up significantly during the 1970's as the average rate of unanticipated inflation has increased. These results suggest that there is an important empirical as well as theoretical distinction to be made between fully anticipated and unanticipated inflation when discussing the effects of inflation on personal savings.

Chart IV

Unanticipated Inflation and the Personal Savings Rate



Summary

The attempt by consumers to maintain a desired relationship between real income and real wealth has resulted in a rise in the personal savings rate in the 1970's. The rise in unanticipated inflation from the mid-1960's is one reason for the rise in the personal savings rate. The only period in the 1970's which saw a significant decline in the personal savings rate was the same year, 1972, in which unanticipated inflation fell. The personal savings rate in 1975 will average in excess of 8%. This savings rate can only be expected to decline when there is a prolonged decline in unanticipated inflation.

FOOTNOTES

1. The article by Kurt Dew in this issue explores in more detail the economic arguments lying behind a desired income-wealth relationship.

2. Statement by Henry C. Wallich, Member, Board of Governors of the Federal Reserve System, before the Joint Economic Committee and the Senate Select Committee on Small Business, Washington, D.C., November 21, 1975.

3. For a more detailed discussion of this use of the Fisher equation see Michael Keran, "Inflation, Regulation and Utility Stock Prices"; *Bell Journal of Economics* (forthcoming, Spring 1976) and S. B. Gupta, "The Portfolio Balance Theory of the Expected Rate of Change of Prices," *Review of Economic Studies,* April 1970.

4. "Inflation and the Consumer," F. Thomas Juster and Paul Wachtel, *Brookings Papers on Economic Activity,* No. 1, 1972.